

CLAIMS

WE CLAIM:

1. A high repetition rate production quality gas discharge laser system with jitter control, said system comprising:

- A) a laser chamber comprising:
 - 1) a laser gas,
 - 2) a pair of elongated electrodes defining a discharge region,
 - 3) a fan for recirculating said laser gas between said electrodes,
 - 4) a heat exchanger for removing heat from said laser gas;
- B) a pulse power system for providing high voltage electrical pulses to produce discharges across said electrodes at repetition rates of 1000 Hz or greater
- C) a controller configured to control jitter of all or substantially all of said discharges to an accuracy of within 0.2 microsecond.

2. A laser system as in Claim 1 wherein said controller is configured to control said timing of an accuracy of within 0.1 microseconds or less.

3. A laser system as in Claim 1 wherein said controller is configured to control said tuning to an accuracy of within 100 to 200 ns or less.

4. A laser system as in Claim 1 wherein said controller is configured to control said timing to an accuracy of within 10 to 20 ns or less.

5. A laser system as in Claim 1 wherein said laser chamber is contained in an easily replaceable module.

6. A laser system as in Claim 5 wherein said most of said pulse power system is contained in an easily replaceable module.

7. A laser system as in Claim 6 wherein all or substantially all components of said laser system are contained in easily replaceable modules.

8. A laser system as in Claim 1 wherein said laser system is configured to function as a light source in a reticle writing system.

9. A laser system as in Claim 1 wherein said laser system is configured to function as a light source for a reticle inspection system.

10. A laser system as in Claim 1 wherein said laser system is configured to function as a light source for a wafer inspection system.

11. A laser system as in Claim 1 wherein said pulse power system comprises a subcircuit including a peaking capacitor bank and the two electrodes wherein said subcircuit has an inductance of less than 5 nH.

12. A laser system as in Claim 1 wherein said repetition rate is about 2000 Hz or greater.

13. A laser system as in Claim 1 wherein said repetition rate is about 3000 Hz or greater.

14. A laser system as in Claim 1 wherein said repetition rate is about 4000 Hz or greater.

15. A laser system as in Claim 1 wherein said laser gas is comprised of krypton, fluorine, and a buffer gas and said system is configured to produce laser light at wavelengths of about 248 nm.

16. A laser system as in Claim 1 wherein said laser gas is comprised of argon, fluorine and a buffer gas and said system is configured to produce light at wavelengths at about 193 nm.

17. A laser system as in Claim 1 wherein said laser is comprised of fluorine and a buffer gas and said system is configured to produce light at wavelengths of about 157 nm.

18. A laser system as in Claim 1 wherein said system comprises two mirrors defining a resonant cavity one of said mirrors having high reflectivity at wavelength of laser beams produced by said laser system and the other of said mirrors being a partially reflecting mirror and configured to function as an output coupler, both mirrors being concave mirrors.

19. A laser system as in Claim 18 wherein said partially reflecting mirror has a reflectivity at said wavelengths in the range of 4% to 30%.

20. A laser system as in Claim 18 wherein each of said mirrors has a concave curvature of about 10 meters.